

INTRODUCTION TO WIRELESS NETWORKING

Wireless is clearly a megatrend in communications. There are so many different and distinct applications and technologies with more emerging everyday. Applied Learning Solutions' Introduction to Wireless Networking provides an overview of the predominant concepts common to all wireless communications and then goes into depth on wireless LAN, fixed, mobile and nomadic wireless technologies and systems.

Audience:

This is a perfect overview course for someone needing familiarity with a broad range of wireless systems or an excellent introduction prior to taking the more in depth courses.

Prerequisites:

There are no prerequisites for this course.

Objectives:

At the conclusion of this course the student will be able to:

- Read and understand product and technical literature for wireless products and services
- Choose the proper wireless technology for specific applications
- Describe the basics and pros & cons of all major wireless technologies in the market today

INTRODUCTION TO WIRELESS NETWORKING

COURSE OUTLINE

Day 1: Wireless Overview

1. Wireless Everywhere

- Fixed, Nomadic and Mobile Wireless
- Global Wireless Market and Applications

2. Wireless Architectures

- Point-to-Point
- Point-to-Multipoint
- Meshed
- Star

3. RF Concepts

- Radio antennas
- Dipole, patch, yagi, grid, parabolic
- Cables and connector usage requirements
- Amplifiers, attenuators, lightning arrestors, splitters
- Spread Spectrum technologies: FHSS, DSSS, PBCC, OFDM
- WLAN data rates and ranges
- RF channels
- Channel reuse
- Fresnel Zones
- Free Space Path Loss (FSPL)
- Interference
- Signal Range
- System Operating Margin (SOM)
- Hidden Nodes?
- Near/Far issue?

4. Wireless Protocols

- FDMA-SCPC
- FDMA-MCPC
- TDM/TDMA
- CDMA systems
- FA-FDMA, DA-FDMA
- FA-TDMA, DA-TDMA

- Aloha, Slotted Aloha
- Reservation Aloha, PRMA,
- DAMA SCPC mesh
- TDM SCPC mesh
- TDMA mesh

5. Satellite Communications

- Geostationary Satellites
- Frequency bands and Polarization
- Frequency Band Trade-offs - L, S, C, X, Ku, & Ka
- Satellite Footprints
- Multibeam Coverage
- Frequency Reuse
- Power spectrum, thermal noise, G/T, EIRP, Eb/No
- RF power, intermodulation noise and Back Off
- Link budgets
- Modulation and coding in Satellite systems
- Satellite earth station components

6. Wireless LANs

- Access Points, Service Sets and the Distribution System
- Access points
- SSID, ESSID, BSSID
- Client devices and accessories
- SOHO networks
- Enterprise Networks
- Beacons, Scanning, Probing
- Authentication
- Association
- Roaming in a wireless LAN
- Inter-Access Point Protocol (IAPP)
- IEEE 802.11f
- Power management features

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COURSE OUTLINE

Day 2: Fixed Wireless continued and Mobile & Nomadic Wireless

7. Bluetooth

- Bluetooth Protocol & Architecture
- Frequency band and RF channels
- Bluetooth frequency hopping
- Master/Slave transmission
- The Packet format
- SCO links and ACL links
- Data rates
- Device addressing
- Controller states
- Access procedures
- Error control

8. Wireless Local Loop (WLL)

- LMDS
- MMDS
- CDMA-based
- Other

9. Mobile and Nomadic Concepts

- Cellular Systems
- Frequency Reuse
- Analog vs. Digital Wireless Systems
- Spectrum Allocation & Interference
- Analog Frequency Division Multiple Access (FDMA)
- Time Division Multiple Access (TDMA)
- Code Division Multiple Access (CDMA)
- Global System Mobile (GSM)
- Interoperability with CDMA & GSM

10. Emerging 3G Technologies

- IMT-2000 Standardization Process
- Business Drivers for 3G technologies
- Data rate requirements
- cdma2000 (TIA TR45.5 / 3GPP2)
- IS-95 A/B implementation
- cdma2000 evolution from IS-9

11. W-CDMA

- Overview of Wideband CDMA & GSM integration
- 3G Wideband for TDMA - Evolution of IS-136 to 2.5G "136+"
- Overview of IS-136 TDMA physical layer
- High Speed IS-136 (IS-136 HS) Outdoor & Indoor